

# PCDAC12-4

## Analogue Output Board

### Technical Manual

## Product Information

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## FREE Windows NT4.0 Drivers

Visit the 'PC(ISA)bus Boards' page on the Arcom Website,  
[www.arcom.co.uk/ntdrv10\\_AR.exe](http://www.arcom.co.uk/ntdrv10_AR.exe) to download.

## Preface

### Packing List

This product is shipped as follows:

- Board
- User Manual
- Utility Disk
- PCbus Library Datasheet

If any of the above appear to be missing, please telephone Arcom 01223 411200.

### Utility Disk

This product is shipped with a utility disk which contains:

- PCbus library Manual
- Source Code for all PCbus I/O boards
- Test programs for calibration.

### Handling

This board contains CMOS devices which could be damaged in the event of static electricity being discharged through them. At all times please observe anti-static precautions when handling the board and always unpack and install the board in an anti-static working area.

Please ensure that should a board need to be returned to Arcom, it is adequately packed and if a battery is fitted, that it is isolated.

## Revision History

Manual	PCB	Comments
Issue A Issue B	V1 Iss 1B V1 Iss 1B	960724 980116 [ECO2684].

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## Introduction

The PCDAC12-4 is an 8-bit ISA bus add-on board with four 12-bit digital to analogue converters (DAC). Voltage output ranges of 5V or 10V, and uni-polar or bi-polar operation may be selected by jumpers. The board also supports 4-20mA current outputs sourced from a regulated 15V supply.

The D-50 I/O connector conforms to Arcom's standard Signal Conditioning System (SCS) and may be used to drive a range of Signal Conditioning Boards (SCB); see Arcom's PCbus catalogue for more details.

### Features

- CE compliant design
- Four independent 12-bit DAC channels
- Voltage output ranges 5V, 10V or external.
- Uni-polar or bi-polar outputs.
- High stability on-board references, 25ppm/°C.
- Current loop outputs, 4-20mA, 15V sourced.
- Compact I/O addressing scheme (link selectable base address)
- Board access LED
- User controlled indicator LED
- 8-bit ISA bus interface
- I/O connector conforms to Arcom Signal Conditioning System (SCS)
- Operating temperature range +5°C to +55°C
- Power required : +5V @ 200mA typical, +12V @ 200mA max.
- MTBF: 235,000 hours (using generic figures from MIL-HDBK-217F at ground benign)

## Getting Started

- Switch off PC
- Install board in supplied configuration
- Switch on PC
- Run EXAMP-01 (supplied on utility disk)
- An access LED should flash. If not check default link configuration.

# Operation

## Reading or Writing to the Board

Control of the PC024 is achieved by writing to a **pointer register** and then accessing a **data register** to read or write the required I/O register. The pointer register need only be written with a new value if a different register is to be accessed. The board occupies only two bytes of PCbus I/O space. Each time the board is accessed the red LED will flash momentarily.

## Setting a DAC value

The DAC channel is first selected by writing to the pointer register. On this board, unlike other Arcom ISA boards, the value is then written to two dedicated data registers. The standard function data register at Base+1 is not used when writing to the DAC's. DAC data is in binary for uni-polar operation and offset binary for bi-polar operation.

## Special Functions

The PCDAC12-4 has two special function registers, User LED and Board Identifier. After the pointer register is set, Read/Write Data for either of these registers is addressed to Base+1

## I/O Map

A value written to the Pointer register is used to select the Function register, or DAC channel next to be accessed.

This board occupies four consecutive addresses and must be set to an address which is a multiple of 4. (e.g. 180h, 184h, 200h)

Address	Read/Write	Register name	Register function
Base	Write only	Pointer register	Select DAC or data register
Base + 1	Read/write	Functions registers	On-board data/control
Base + 2	Write only	DAC low byte	LS Data to DAC
Base + 3	Write only	DAC high byte	MS data to DAC

## I/O Function Registers

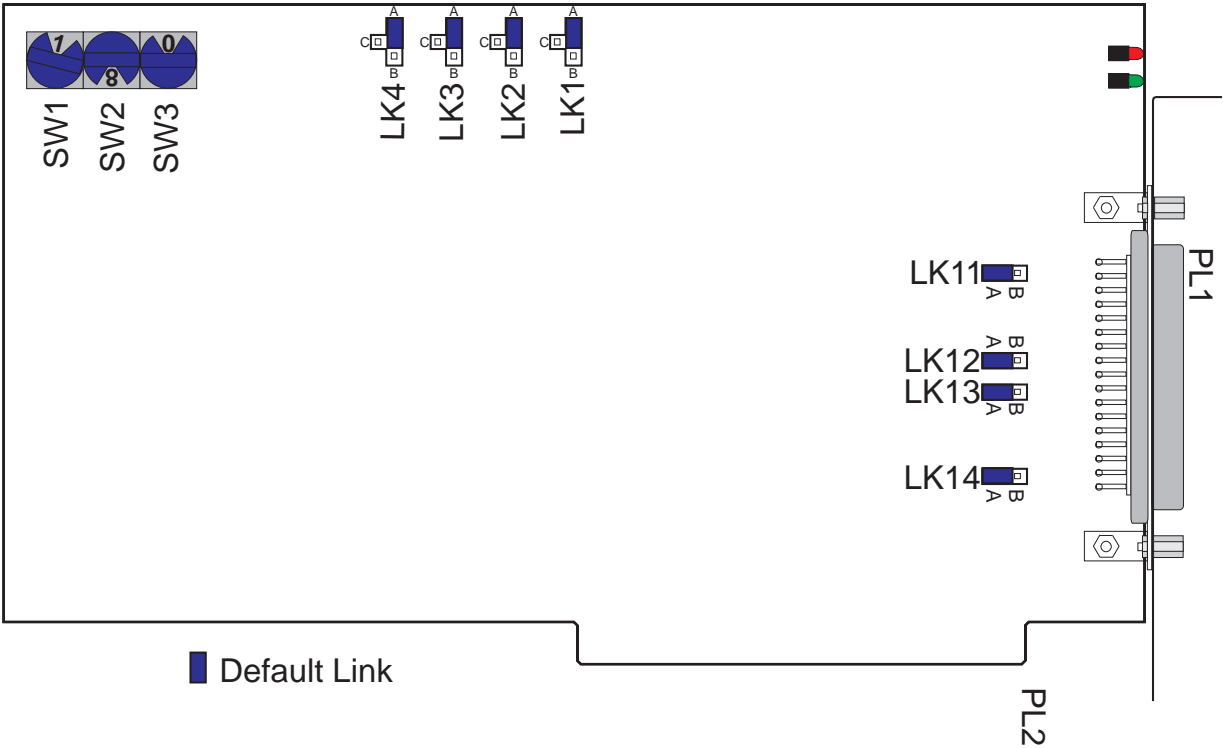
Pointer value (hex)	Read/Write	Function Register Name	Data Bit	Function
0	Write	DAC 0	None	Select DAC 0 for data write
01	Write	DAC 1	None	Select DAC 1 for data write
02	Write	DAC 2	None	Select DAC 2 for data write
03	Write	DAC 3	None	Select DAC 3 for data write
80	Write	User LED	Bit 0 only	1 = Green LED on
				0 = Green LED off
81	Read	Board identification	Bit 0-7	Always 29h for PCDAC12-4

**DAC Data Registers**

Address	Register Name	Data Bit	Function
Base +2	DAC low byte	Bit 0-3	Not Used
		Bit 4-7	DAC data bit 0-3
Base + 3	DAC high byte	Bit 0-7	DAC data bit 4-11

# Links

Default Link Position Diagram



## Base address switches

The three rotary switches adjust the base addresss of the board. A hexadecimal value for the address is shown directly in the dial windows.

## Board functions

### LK1, LK2, LK3, LK4

These links select the range independently for each DAC. LK1 operates with DAC0, LK2 with DAC1 etc.

+

LK1..4A	5V output range
LK1..4B	10V output range
LK1..4C	External range

An external reference, or audio band AC signal must be connected to the corresponding input pin on the D50, when the 'C' position is set.



**LK11, LK12, LK13, LK14**

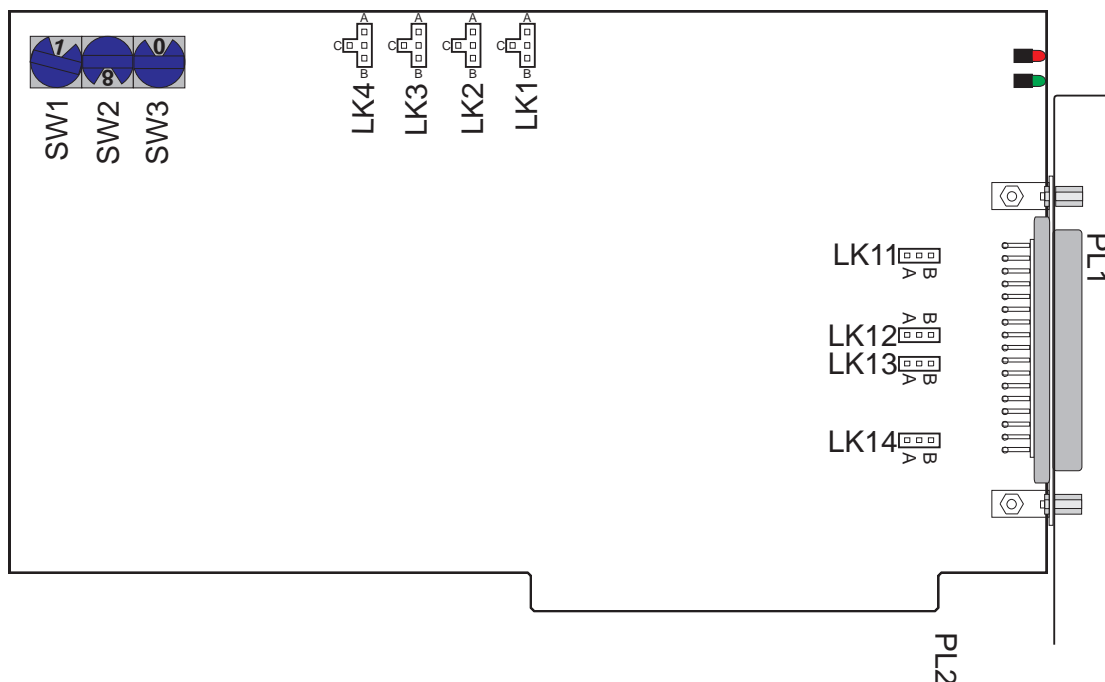
These links select uni-polar or bi-polar operation for the corresponding DAC channel. LK11 operates with DAC0, LK12 with DAC1 etc.

+	LK11..14A	Uni-polar voltage output
	LK11..14B	Bi-polar voltage output

**Current loop outputs**

To scale a current loop output correctly, the links must be set for the corresponding DAC voltage output:

LK1..4A	5V range
LK11..14A	Uni-polar output

**User Configuration Record Diagram**

Link	Default	User
LK1		
LK2		
LK3		
LK4		
LK11		
LK12		
LK13		
LK14		

## Calibration

PCDAC12-4 is accurately calibrated before leaving the factory, however re-calibration will be required from time to time. There are six trimmers on the board which are intended for fine adjustments only.

To calibrate the board, the test program, e.g. PCDAC124.bas or demda124.C., should be used and measurements made with a 5digit DVM (or better).

### VR5, VR6 Reference Trim

VR5	10V reference adjust
VR6	5V reference adjust

- Set one of LK1 to LK4 to the desired range.
- Monitor the voltage at the link ref. analogue 0V.
- Adjust the corresponding trimmer to give exactly 5V or 10V

### VR1, VR2, VR3, VR4 Channel Trim

These trimmers adjust individual channels, VR1 for DAC0, VR2 for DAC1 etc. The effect at the output is to adjust full-scale on a uni-polar channel, and to adjust the zero point for a bi-polar channel.

#### Uni-Polar Channel

- Set the jumpers for the required uni-polar range.
- Monitor the output voltage ref. analogue 0V.
- Use the program to set the DAC to half-scale (0800h)
- Adjust the corresponding trimmer to give 2.50V (5V range) or 5.00V (10V range).

#### Bi-Polar Channel

- Set the jumpers for the required bi-polar range.
- Monitor the output voltage ref. analogue 0V.
- Use the program to set the DAC to half-scale (0800h)
- Adjust the corresponding trimmer to give 0.00V.

## Connectors

Signal Title	D Type No.	RC No.
+5V	50	50
+5V	17	49
+12V	33	48
-12V	49	47
D-A4 V.OUT	16	46
D-A3 V.OUT	32	45
D-A2 V.OUT	48	44
D-A1 V.OUT	15	43
	31	42
0VA	47	41
0VA	14	40
EXTIN4	30	39
0VA	46	38
EXTIN3	13	37
0VA	29	36
EXTIN2	45	35
0VA	12	34
EXTIN1	28	33
	44	32
0VA	11	31
	27	30
	43	29
	10	28
	26	27
	42	26
	9	25
	25	24
	41	23
	8	22
0VA	24	21
	40	20
	7	19
	23	18
	39	17
	6	16
	22	15
	38	14
	5	13
	21	12
0VA	37	11
0VA	4	10
D-A4 I.OUT	20	9
0VA	36	8
D-A3 I.OUT	3	7
0VA	19	6
D-A2 I.OUT	35	5
0VA	2	4
D-A1 I.OUT	18	3
0V	34	2
0V	1	1

## Installation for CE Compliance

To maintain compliance with requirements of the EMC Directive (89/336/EEC) this product must be correctly installed. The PC in which the board is housed must be CE compliant as declared by the PC Manufacturer. The external I/O cable should be Arcom CAB50CE or a fully screened cable to the same pattern.

1. Remove the cover of the PC observing any additional instructions of the PC manufacturer.
2. Locate the board in a spare ISA slot and press gently but firmly into place.
3. Ensure that the metal bracket attached to the board is fully seated.
4. Fit in the bracket clamping screw and firmly tighten this on the bracket.
5. Fit the screened I/O cable to the 50 way board connector.
6. Ensure that the jack screws for the cable connector are tightened (use a screw driver).
7. Replace the cover of the PC observing any additional instructions on the PC manufacturer.

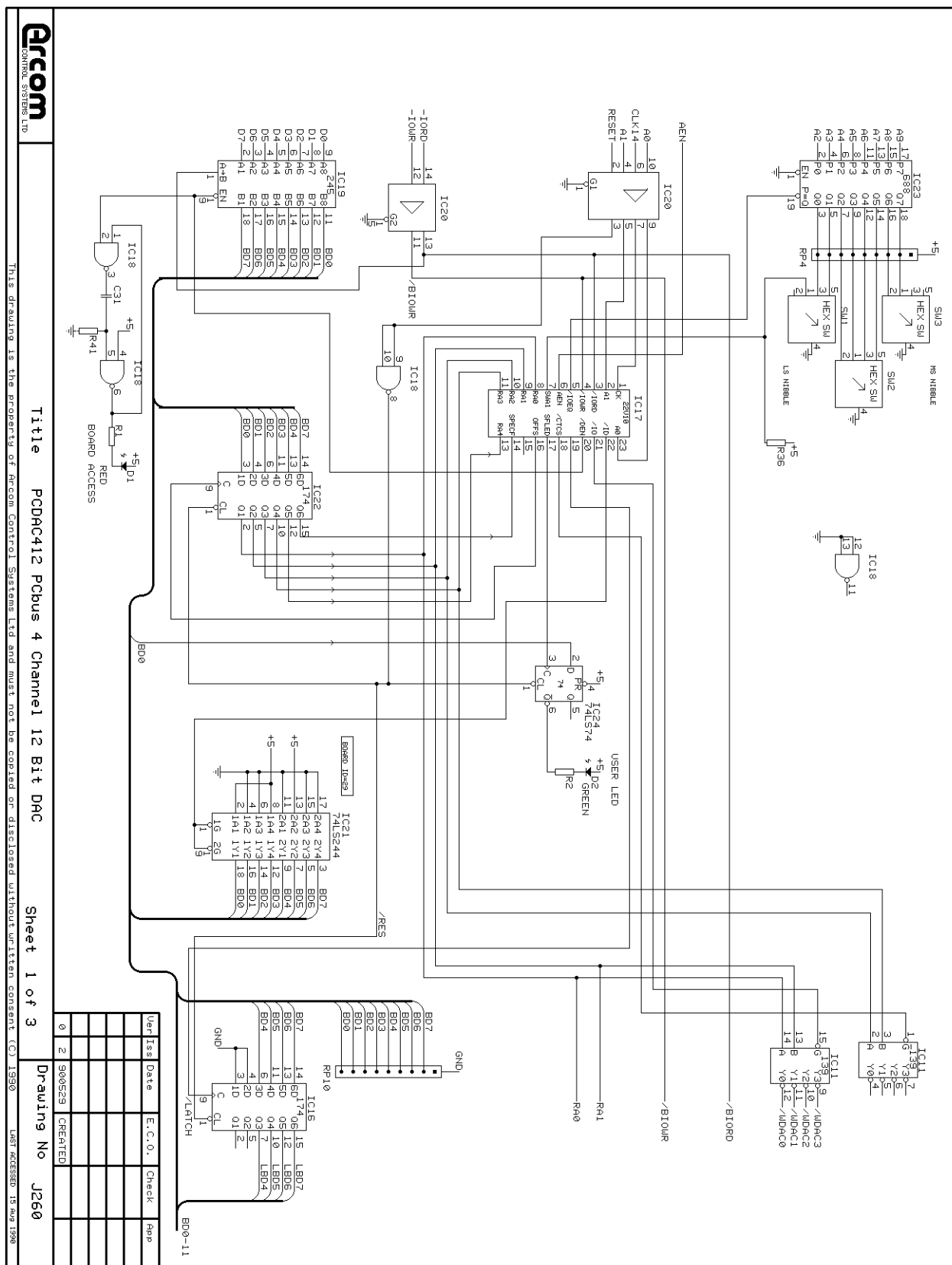
*The following standards have been applied to this product:*

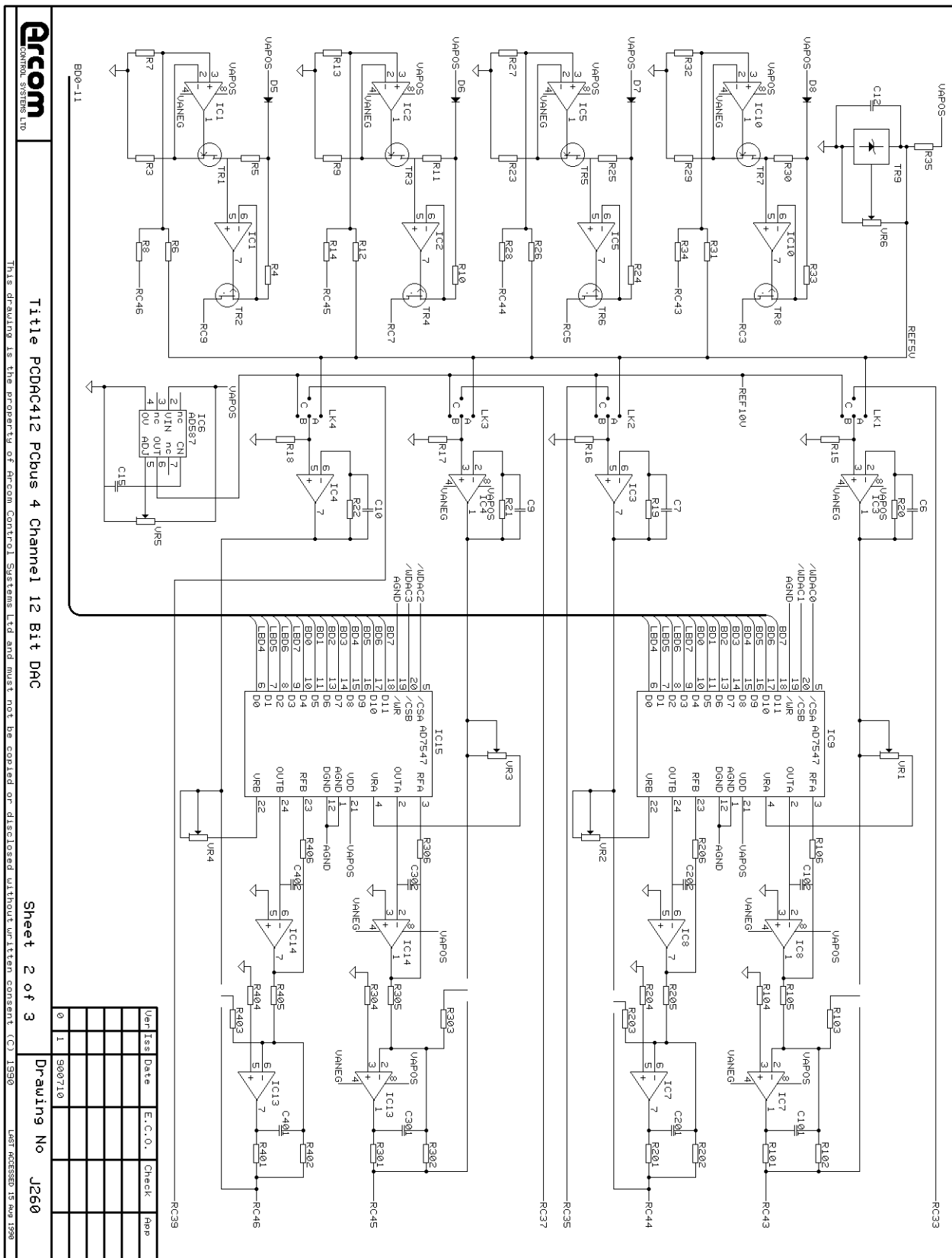
**BS EN50081-1:** 1992 Generic emissions standard, Domestic, commercial, light industry

**BS EN50082-1:** 1992 Generic immunity standard, Domestic, commercial, light industry

**BS EN55022** : ITE Emissions, Class B, Limits and methods.

# Circuit Diagrams





50 WAY D SOCKET

PL2

+5 RC50 D50  
 +5 RC49 D17  
 +5 RC48 D33  
 +12 RC47 D49  
 -12 RC46 D16  
 RC48 RC45 D32  
 RC44 RC44 D48  
 RC43 RC43 D15  
 RC42 RC42 D31  
 RC41 D47  
 RC40 D14  
 RC39 D30  
 RC38 D46  
 RC37 D13  
 RC36 D29  
 RC35 D45  
 RC34 D12  
 RC33 RC33 D28  
 RC32 D44  
 RC31 D11  
 RC30 D27  
 RC29 D43  
 RC28 D19  
 RC27 D25  
 RC26 D42  
 RC25 D9  
 RC24 D25  
 RC23 D41  
 RC22 D8  
 RC21 D24  
 RC20 D40  
 RC19 D7  
 RC18 D23  
 RC17 D39  
 RC16 D6  
 RC15 D22  
 RC14 D38  
 RC13 D5  
 RC12 D21  
 RC11 D37  
 RC10 D4  
 RC9 RC9 D20  
 RC8 D96  
 RC7 D3  
 RC6 D19  
 RC5 D95  
 RC4 D2  
 RC3 D18  
 RC2 D34  
 AGND RC1 D1

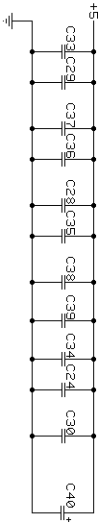
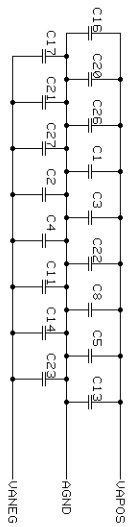
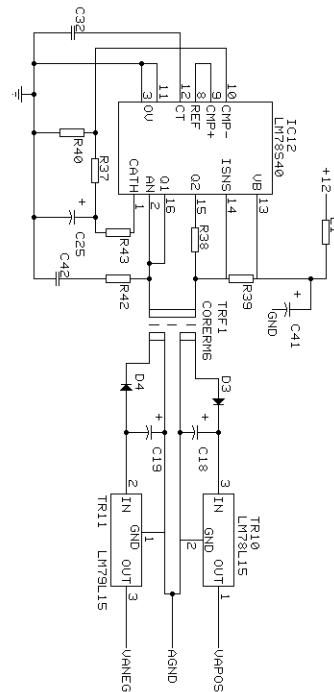
THE RIBBON-CABLE WIRE NUMBERS START WITH RC  
 THE D CONNECTOR PIN NUMBERS ON THE  
 PCB-MOUNTED D CONNECTOR START WITH D

PL1

IMCON  
 A0 31 A B 31  
 A1 30 GND B 30  
 A2 29 CLK14 B 29  
 A3 28 +5 B 28  
 A4 27 B 27  
 A5 26 B 26  
 A6 25 B 25  
 A7 24 -1R03 B 24  
 A8 23 B 23  
 A9 22 B 22  
 21 B 21  
 20 B 20  
 19 B 19  
 18 B 18  
 17 B 17  
 16 B 16  
 15 B 15  
 14 -10RD B 14  
 13 -10WR B 13  
 12 B 12  
 11 B 11  
 AEN 10 GND B 10  
 D0 9 -12 B 9  
 D1 8 B 8  
 D2 7 -12 B 7  
 D3 6 B 6  
 D4 5 B 5  
 D5 4 -1R02 B 4  
 D6 3 +5 B 3  
 D7 2 -RESET B 2  
 1 AGND B 1

RHS COMPONENT SIDE

SOLDER SIDE


**Arcom**  
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Title PCDAC412 Pcbus 4 Channel 12 Bit DACSheet 3 of 3

Drawing No J260

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Rev	Iss	Date	E.C.O.	Check	App
0					
1	JB	30/06/11			
2					

